

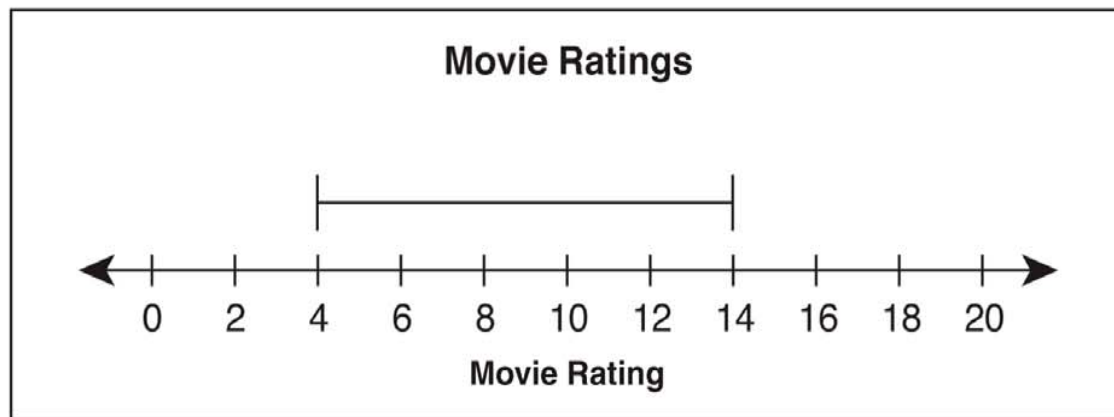
# California Common Core State Standards – Mathematics (CaCCSS–M)

March 12, 2011  
Bruce Grip  
Annette Kitagawa

Fifteen students watched a movie and rated the movie on a scale of 1 (very bad movie) to 20 (very good movie). Their ratings are shown in the table.

- a. Using the data in the table, complete the box-and-whisker plot by adding the upper quartile, the lower quartile, and the median. A box will be formed with the three points indicated. You will be able to adjust the box once created if needed.

**Click on the line to add the upper quartile, lower quartile, and median.**



Submit

**Movie Ratings**

Student	Movie Rating
Andy	14
Bee	8
Cory	5
Doug	8
Jamal	5
Jasper	11
Jenn	12
Katie	13
Martin	9
Pat	11
Rose	13
Sam	4
Sofie	7
Thomas	12
Young	9

(continued)

b. The teacher gave the movie a rating of 8. The teacher's rating was added to the ratings of the 15 students. Explain how the addition of the teacher's rating will affect the:

- minimum
- maximum
- upper quartile
- lower quartile
- median

Enter response here



Submit

# Agenda

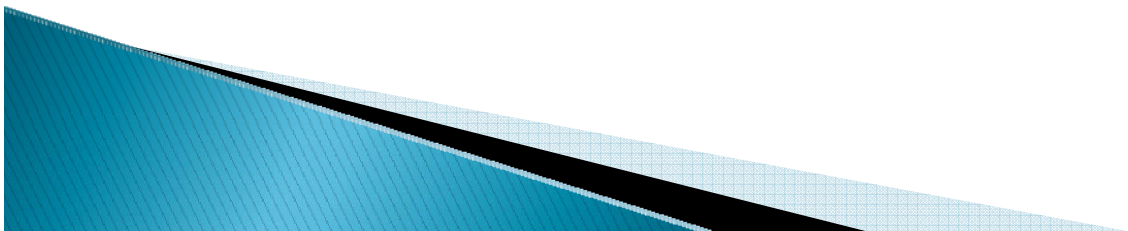
- ▶ General Overview
- ▶ Structure
- ▶ Similarities
- ▶ Shifts (Differences)
- ▶ Assessments
- ▶ Next Steps

Content taken from presentations of CDE & SCOE

A decorative graphic element in the bottom left corner consisting of overlapping blue and black geometric shapes, including a large blue triangle and a black triangle.

# The Common Core State Standards Initiatives

- ▶ A voluntary state-led effort coordinated by the Council of Chief State School Officers (CCSSO) and the National Governors Association Center for Best Practices (NGA Center)
- ▶ Included parents, educators, content experts, researchers, national organizations and community groups from 48 states, 2 territories and the District of Columbia



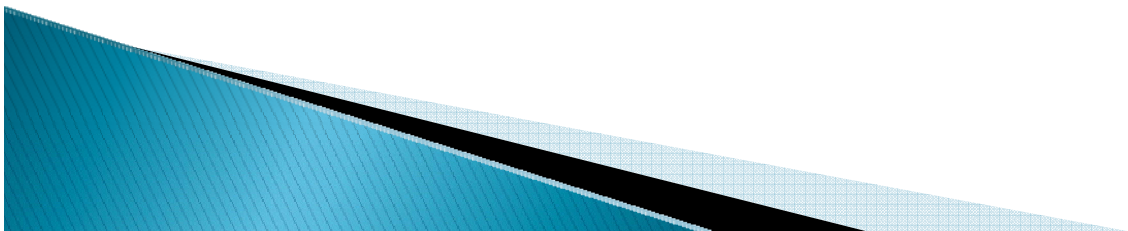
# The Common Core State Standards Initiatives

- ▶ Feedback and review from national organizations, including:
  - American Council on Education (ACE)
  - American Federation of Teachers (AFT)
  - Campaign for High School Equity (CHSE)
  - Conference Board of the Mathematical Sciences (CBMS)
  - Modern Language Association (MLA)
  - National Council of Teachers of English (NCTE)
  - National Council of Teachers of Mathematics (NCTM)
  - National Education Association (NEA)



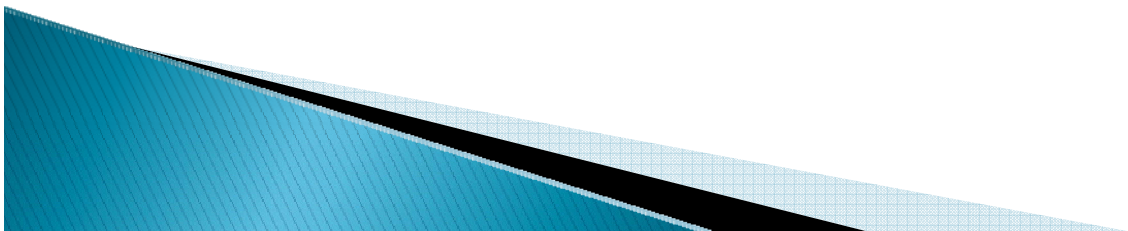
# College and Career Readiness Standards

- ▶ In September 2009, College and Career Readiness draft Standards were released
- ▶ The focus of the CCS is to guarantee that all students are college and career ready as they exit from high school.



# The Common Core Standards

- ▶ Rigorous, research-based standards for English–language arts and mathematics for grades K–12
- ▶ Designed to prepare the nation's students with the knowledge and skills needed for success in college and the workforce
- ▶ Internationally benchmarked to ensure that students will be globally competitive
- ▶ A clear and consistent educational framework
- ▶ A collaborative effort that builds on the best of current state standards

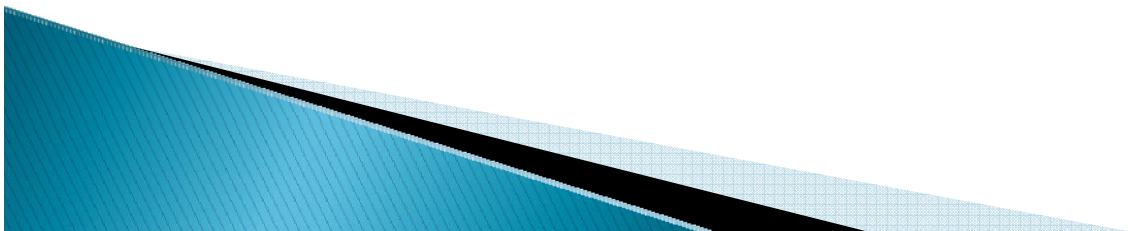




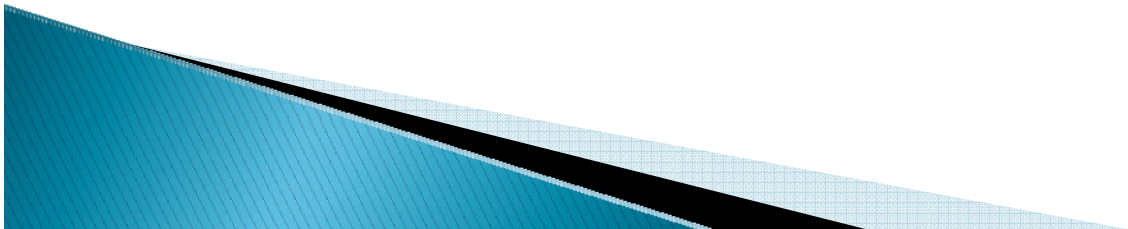
# California Academic Content Standards Commission (CACSC)

- ▶ SB 5X 1 created the 21 member standards commission:
  - 11 Governor Appointees
  - 5 Senate Appointees
  - 5 Assembly Appointees

Not less than half must be current teachers

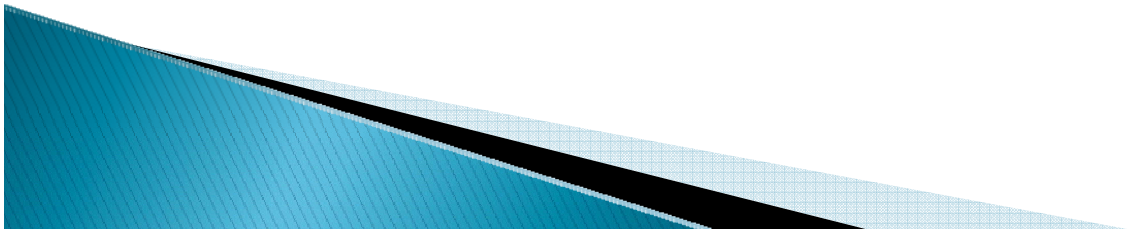


- ▶ For California, 85% of the standards recommendation must be the CCS.
- ▶ 15% could be additional standards added by California to ensure the rigor.

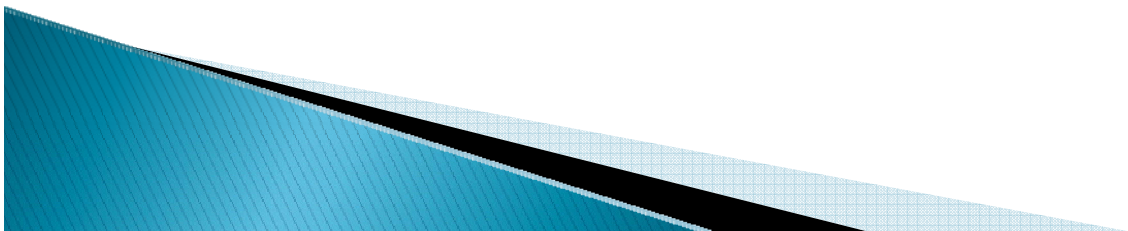


# California's Additional 15%

- ▶ Based on the following criteria:
  - Substantively enhance
  - Address a perceived gap
  - Be defensible to classroom practitioners
  - Keep the original standard intact (“no eraser”)
  - Ensure the rigor of California's existing standard is maintained



On August 2, 2010, the State Board of Education adopted the standards recommended by the California Academic Content Standards Commission.



# Common Core Standards Overview: Toward Greater Focus and Coherence

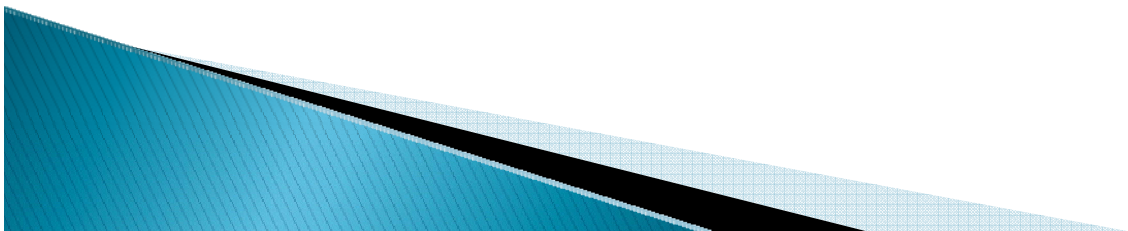
Avoid the  
problem  
of “mile  
wide and  
an inch  
deep”

Recognize  
that “fewer  
standards” are  
no substitute  
for focused  
standards

Aim for  
clarity and  
specificity

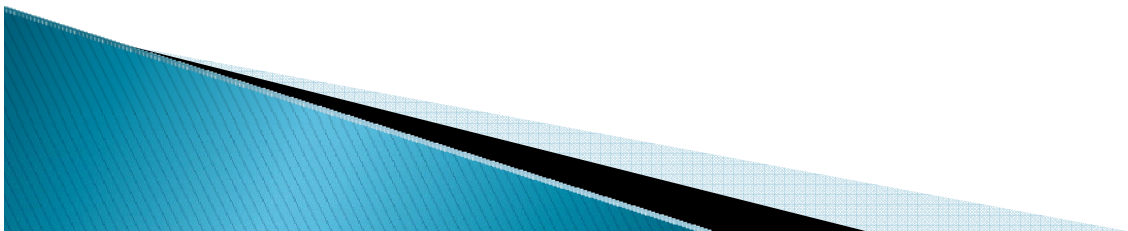
# Coherence Design

- ▶ Topics and performances are logical over time
- ▶ Based on learning progressions research on how students learn
- ▶ Reflect hierarchical nature of the content
- ▶ Evolve from particulars to deeper structures



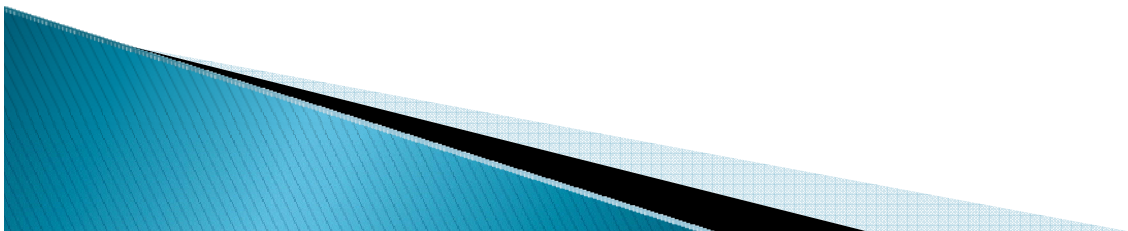
# Common Core Standards

- ▶ Define what students should understand and be able to do in their study of mathematics
- ▶ Set grade-level standards K–8
- ▶ Identifies standards for Algebra 1
- ▶ Provide conceptual cluster standards in high school
- ▶ Provide clear signposts along the way toward the goal of college and career readiness for all students



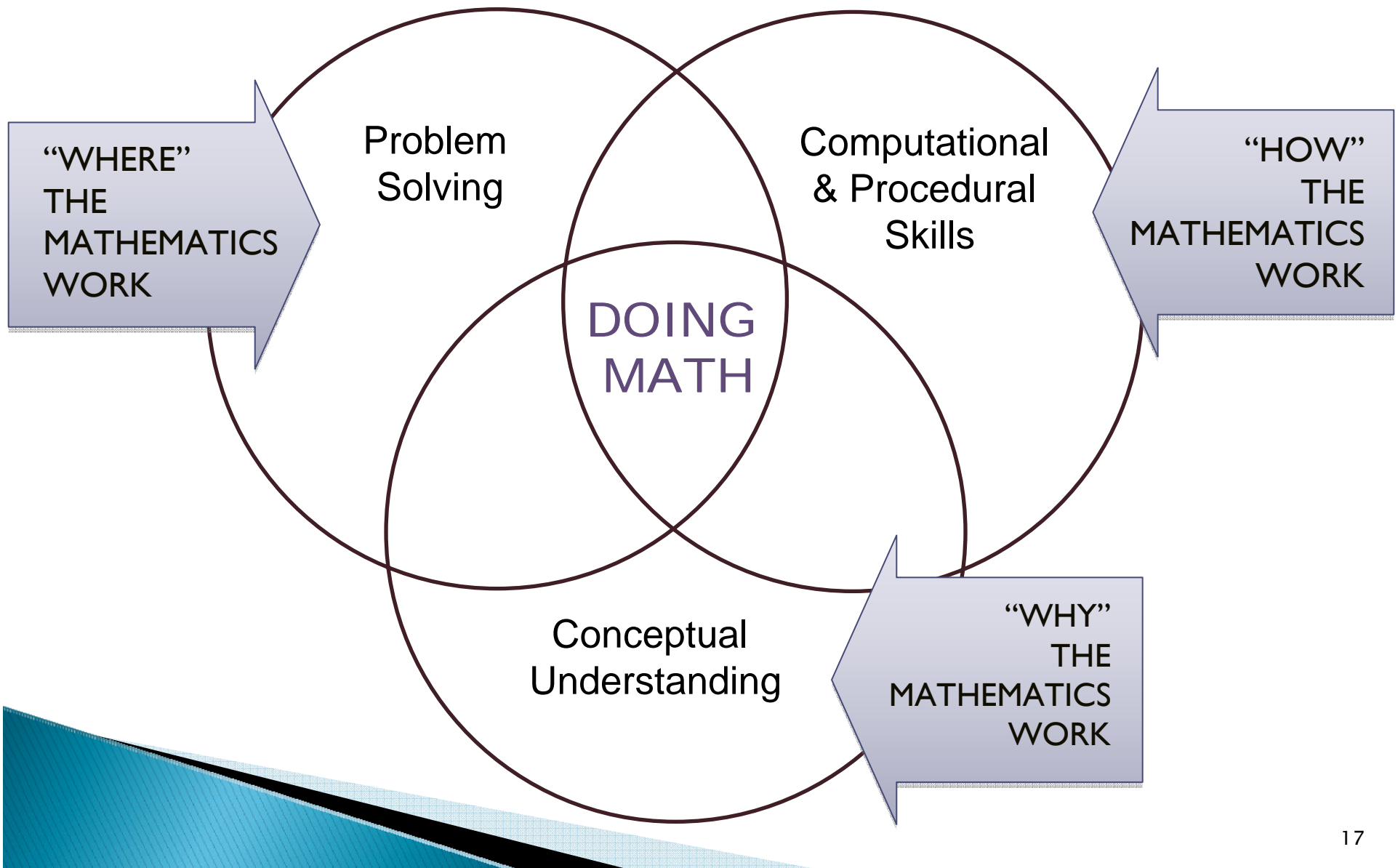
# Common Core Standards: Mathematical Proficiency

- ▶ Standards for Mathematical Practice
  - Describe varieties of expertise that educators should seek to develop in their students.
  - Rest on important “processes and proficiencies”
  - Related to mathematical proficiency as defined by the California Framework





# Mathematical Proficiency as defined by the California Framework



# Standards for Mathematical Practice...

*“...describe ways in which developing student practitioners of the discipline of mathematics increasingly ought to engage with the subject matter as they grow in mathematical maturity and expertise throughout the elementary, middle and high schools years.”*

# Standards for Mathematical Practice...

*“...describe ways in which developing student practitioners of the discipline of mathematics increasingly ought to engage with the subject matter as they grow in mathematical maturity and expertise throughout the elementary, middle and high schools years.”*

## Standards for Mathematical Practice

### Mathematically proficient students:

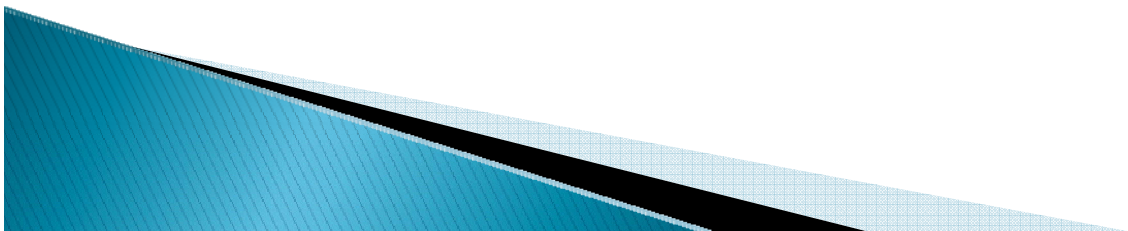
1. Make sense of problems and persevere in solving them  
*...start by explaining to themselves the meaning of a problem and looking for entry points to its solution*
2. Reason abstractly and quantitatively  
*...make sense of quantities and their relationships to problem situations*
3. Construct viable arguments and critique the reasoning of others  
*...understand and use stated assumptions, definitions, and previously established results in constructing arguments*
4. Model with mathematics  
*...can apply the mathematics they know to solve problems arising in everyday life, society, and the workplace*



## Standards for Mathematical Practice

# Mathematically proficient students:

5. Use appropriate tools strategically  
*...consider the available tools when solving a mathematical problem*
6. Attend to precision  
*...calculate accurately and efficiently*
7. Look for and make use of structure  
*...look closely to discern a pattern or structure*
8. Look for and express regularity in repeated reasoning  
*...notice if calculations are repeated, and look for both general methods and for shortcuts*

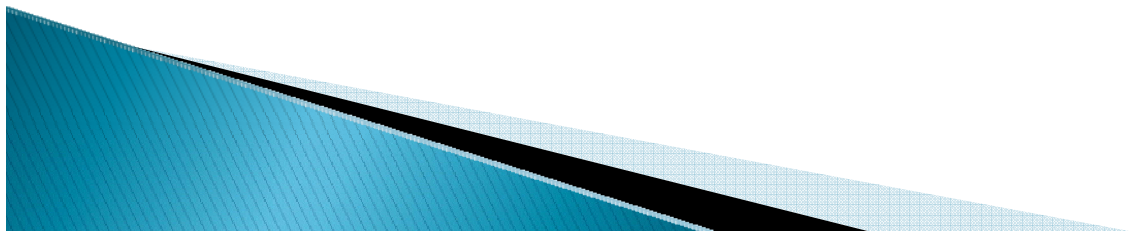


# 8 Mathematical Practices

## Standards for Mathematical Practice

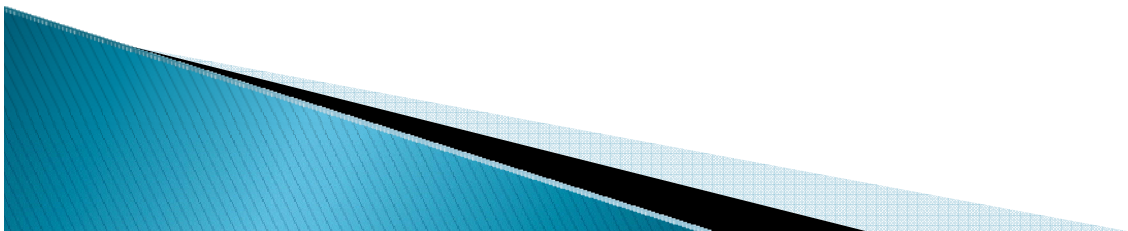
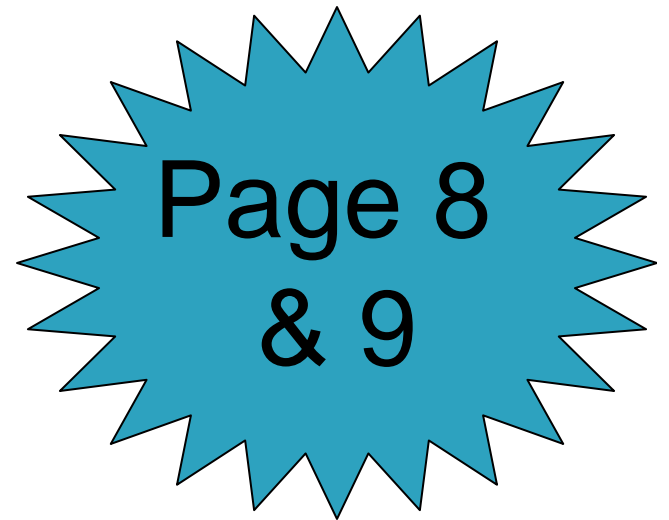
### 1. Make sense of problems and persevere in solving them.

Mathematically proficient students start by explaining to themselves the meaning of a problem and looking for entry points to its solution. They analyze givens, constraints, relationships, and goals. They make conjectures about the form and meaning of the solution and plan a solution pathway rather than simply jumping into a solution attempt. They consider analogous problems, and try special cases and simpler forms of the original problem in order to gain insight into its solution. They monitor and evaluate their progress and change course if necessary. Older students might, depending on the context of the problem, transform algebraic expressions or change the viewing window on their graphing calculator to get the information they need. Mathematically proficient students can explain correspondences between equations, verbal descriptions, tables, and graphs or draw diagrams of important features and relationships, graph data, and search for regularity or trends. Younger students might rely on using concrete objects or pictures to help conceptualize and solve a problem. Mathematically proficient students check their answers to problems using a different method, and they continually ask themselves, "Does this make sense?" They can understand the approaches of others to solving complex problems and identify correspondences between different approaches.



# Standards for Mathematical Practice

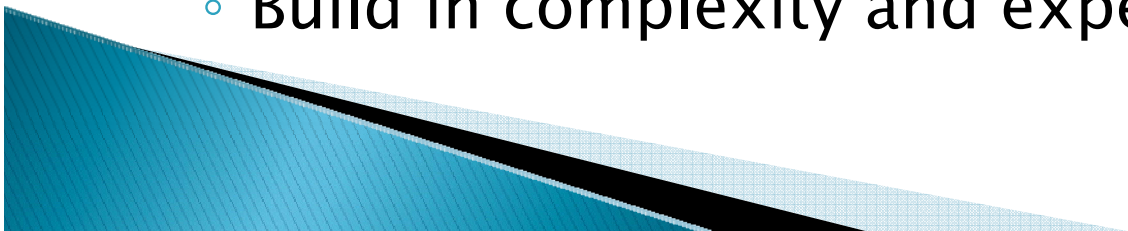
- ▶ How do these 8 Practices align with the “balanced” math program as outlined in the current math framework?
- ▶ Select one of the 8 Practices to analyze with an elbow partner.
- ▶ What are the implications for classroom practice?



# Connecting Practices to Content

## ▶ Standards

- *Balanced combination of procedure and understanding*
- “Understand” expectations connect practice to content.
  - Lack of understanding prevents students from engaging in the mathematical practices
  - Weighted toward central and generative concepts that most merit the time, resources, innovative energies and focus
- Build in complexity and expected performance





# Connecting Practices to Content: Examples

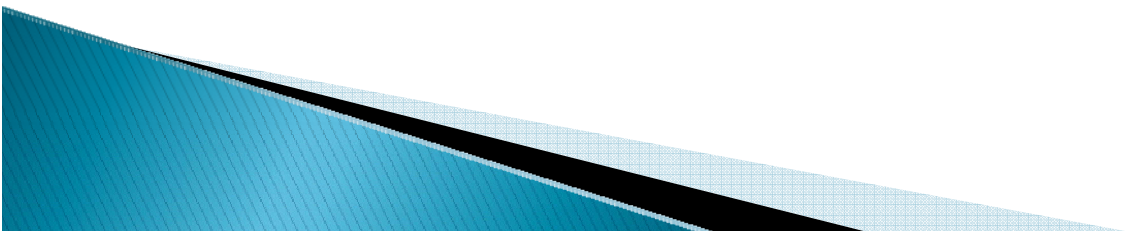
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<b>Kindergarten</b>	Understand addition as putting together and adding to, and understand subtraction as taking apart and from
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<b>First</b>	Understand place value
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<b>Second</b>	Understand place value and use that understanding and properties of operations to add and subtract
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# Connecting Practices to Content: Examples

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<b>Third</b>	Develop understanding of fractions as numbers
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<b>Fourth</b>	Understand decimal notation for fractions, and compare decimal fractions
---------------	--

<b>Fifth</b>	Apply and extend previous understandings of multiplication and division to multiply and divide fractions
--------------	--

<b>Sixth</b>	Apply and extend previous understandings of arithmetic to algebraic expressions
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<b>Seventh</b>	Apply and extend previous understandings of operations with fractions to add, subtract, multiply and divide rational numbers
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# Grade K–8 Standards

## ▶ Overview page

- Lists domains, clusters and mathematical practices

## ▶ Standards–by grade level

- Defines what students should understand and be able to do

## ▶ Clusters

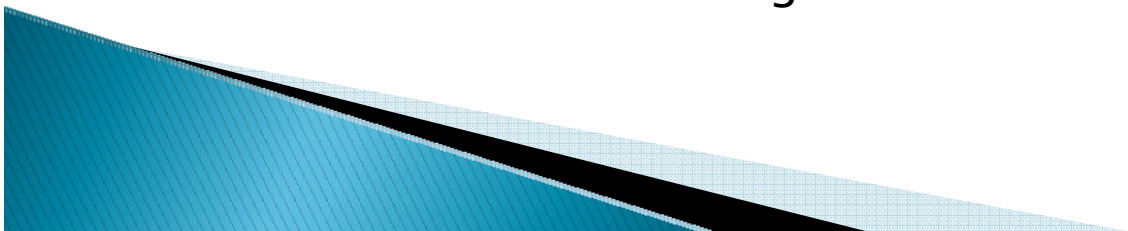
- Groups of related standards. Standards from different clusters may be closely related

## ▶ Domains

- Larger groups of related standards. Standards from different domains may be closely related.

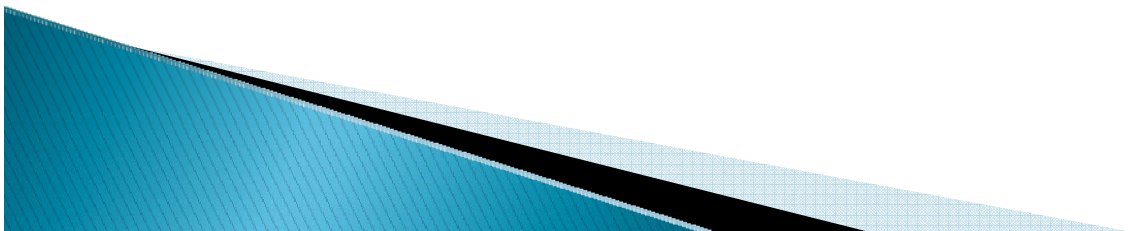
## ▶ Additional standard language or whole standards

- Bolded and underlined
- Added to maintain rigor of California expectations



# Third Grade Document

- ▶ Peruse the Third Grade analysis of CA Standards and CCSS
  - What are some highlights you noticed?
  - What are some similarities/differences?
  - What are the implications for instruction?



# Grade K–8 Standards

## ▶ Overview page

- Lists domains, clusters and mathematical practices

## ▶ Standards–by grade level

- Defines what students should understand and be able to do

## ▶ Clusters

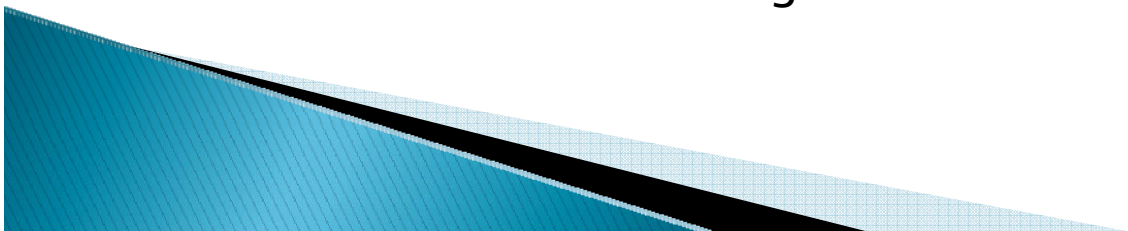
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## ▶ Domains

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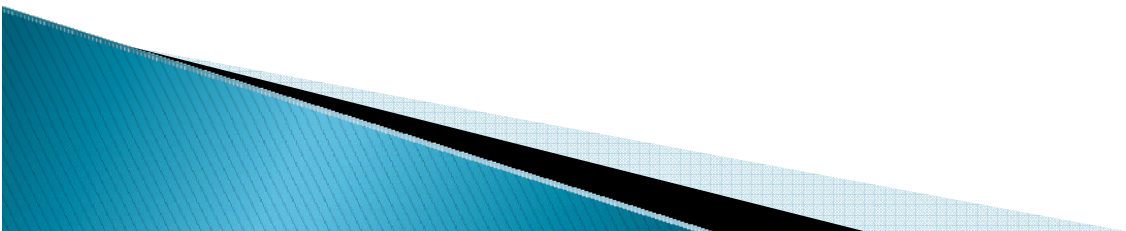


# Mathematics Standards for High School

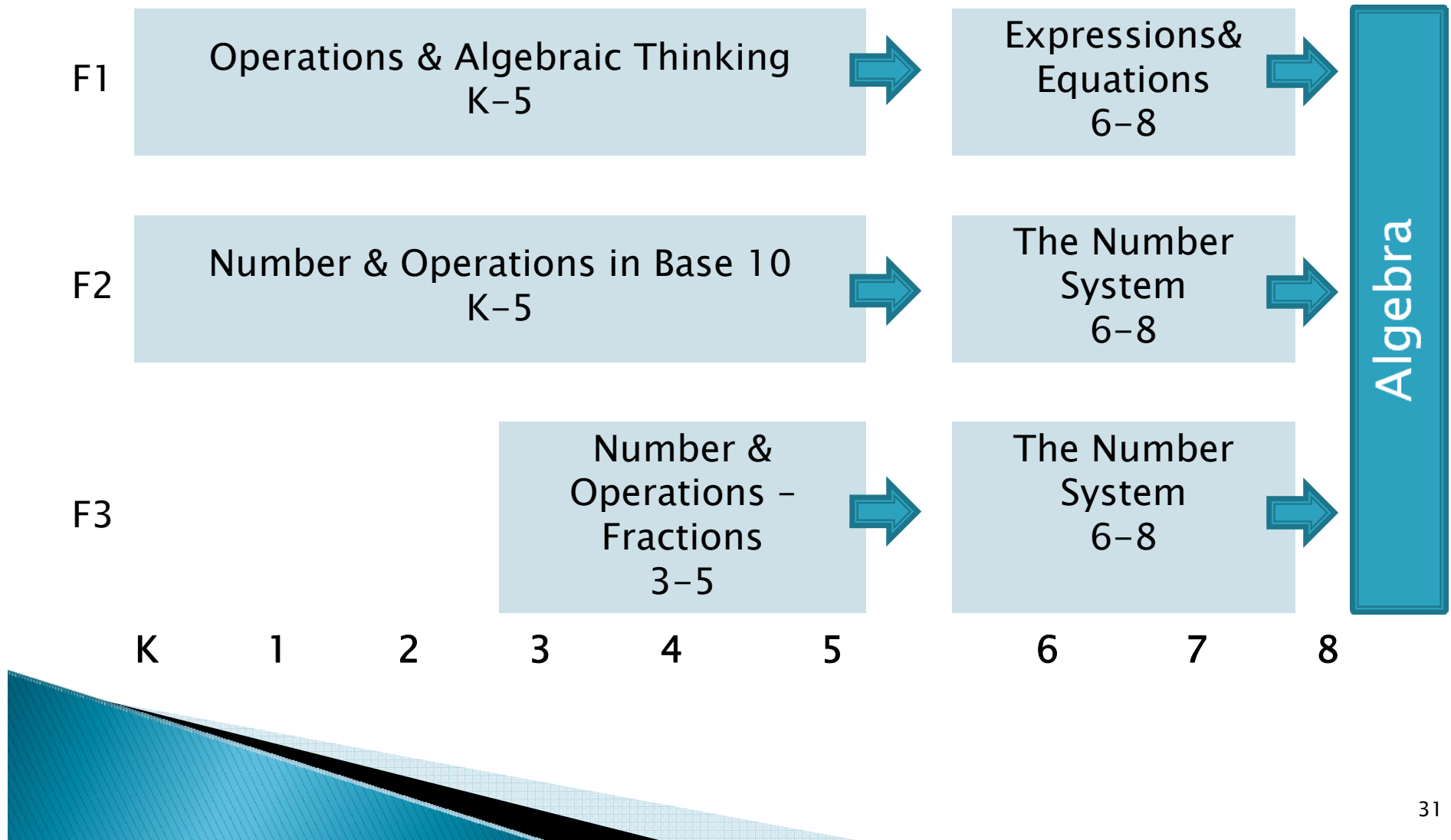
Arranged by conceptual cluster (NOT by course):

- Number and Quantity
- Algebra
- Functions
- Modeling
- Geometry
- Statistics and Probability

Same K–8 structure of domain, cluster and standard



# Flows of K–8 Standards Leading to Algebra I



# K–8 Grade Section Overview Page

## Grade 3 Overview

### Operations and Algebraic Thinking

- Represent and solve problems involving multiplication and division.
- Understand properties of multiplication and the relationship between multiplication and division.
- Multiply and divide within 100.
- Solve problems involving the four operations, and identify and explain patterns in arithmetic.

### Number and Operations in Base Ten

- Use place value understanding and properties of operations to perform multi-digit arithmetic.
- 

### Number and Operations—Fractions

- Develop understanding of fractions as numbers.

### Measurement and Data

- Solve problems involving measurement and estimation of intervals of time, liquid volumes, and masses of objects.
- Represent and interpret data.
- Geometric measurement: understand concepts of area and relate area to multiplication and to addition.
- Geometric measurement: recognize perimeter as an attribute of plane figures and distinguish between linear and area measures.

### Geometry

- Reason with shapes and their attributes.

### Mathematical Practices

1. Make sense of problems and persevere in solving them.
2. Reason abstractly and quantitatively.
3. Construct viable arguments and critique the reasoning of others.
4. Model with mathematics.
5. Use appropriate tools strategically.
6. Attend to precision.
7. Look for and make use of structure.
8. Look for and express regularity in repeated reasoning.

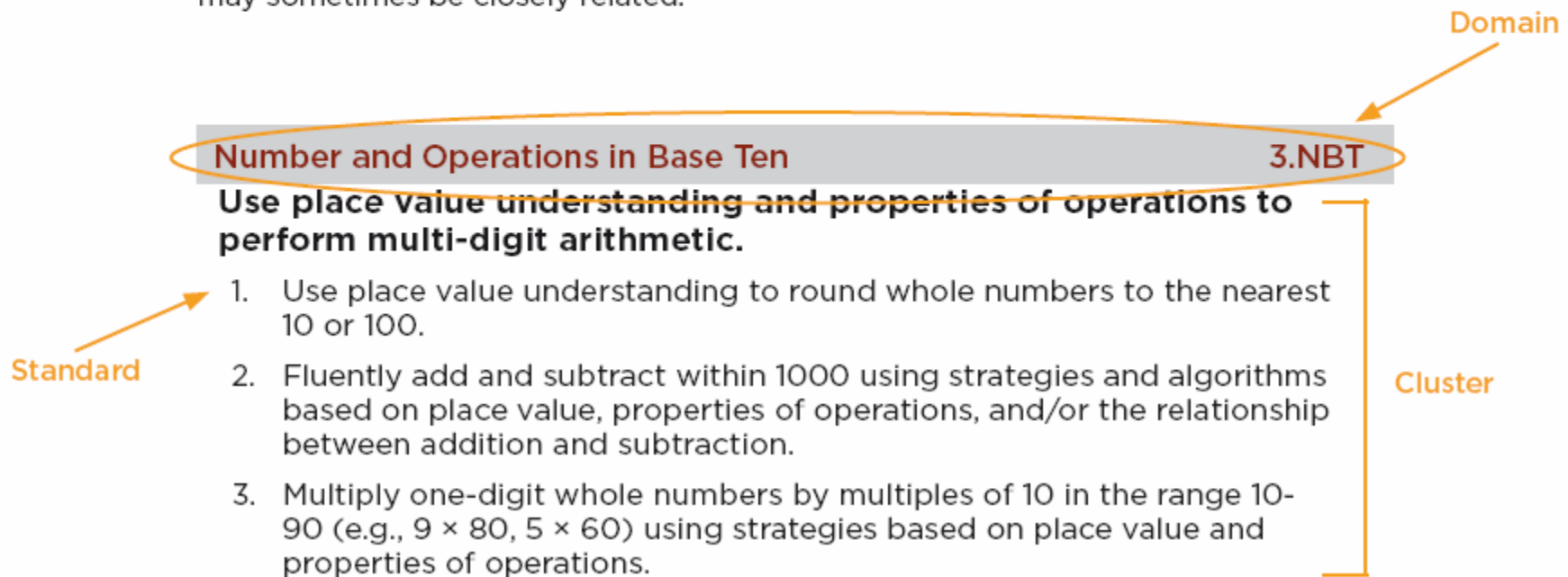


# How to read the grade level standards

**Standards** define what students should understand and be able to do.

**Clusters** are groups of related standards. Note that standards from different clusters may sometimes be closely related, because mathematics is a connected subject.

**Domains** are larger groups of related standards. Standards from different domains may sometimes be closely related.



# Grade 2 Example

## Grade 2

### Operations and Algebraic Thinking

2.OA

**Represent and solve problems involving addition and subtraction.**

1. Use addition and subtraction within 100 to solve one- and two-step word problems involving situations of adding to, taking from, putting together, taking apart, and comparing, with unknowns in all positions, e.g., by using drawings and equations with a symbol for the unknown number to represent the problem.<sup>1</sup>

**Add and subtract within 20.**

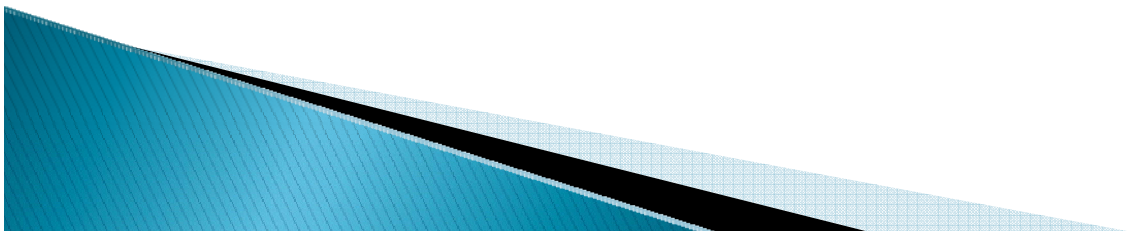
2. Fluently add and subtract within 20 using mental strategies.<sup>2</sup> By end of Grade 2, know from memory all sums of two one-digit numbers.

**Work with equal groups of objects to gain foundations for multiplication.**

3. Determine whether a group of objects (up to 20) has an odd or even number of members, e.g., by pairing objects or counting them by 2s; write an equation to express an even number as a sum of two equal addends.
4. Use addition to find the total number of objects arranged in rectangular arrays with up to 5 rows and up to 5 columns; write an equation to express the total as a sum of equal addends.

**4.1 Use repeated addition, and counting by multiples to demonstrate multiplication.**

**4.2 Use repeated subtraction and equal group sharing to demonstrate division.**

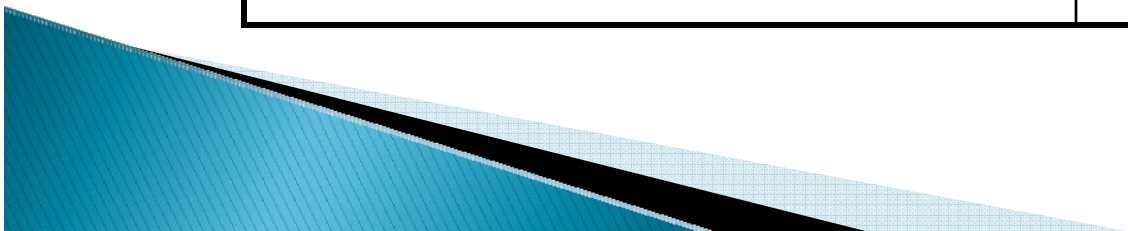


# K – Grade 5 Domains

Domain	K	1	2	3	4	5
Counting and Cardinality (CC)	✓					
Operations and Algebraic Thinking (OA)	✓	✓	✓	✓	✓	✓
Number and Operations in Base Ten (NBT)	✓	✓	✓	✓	✓	✓
Measurement and Data (MD)	✓	✓	✓	✓	✓	✓
Geometry (G)	✓	✓	✓	✓	✓	✓
Number and Operations – Fractions (NF)				✓	✓	✓

# Grades 6 – 8 Domains

Domain	6	7	8
Ratios and Proportional Relationships (RP)	✓	✓	
The Number System (NS)	✓	✓	✓
Expressions and Equations (EE)	✓	✓	✓
Geometry (G)	✓	✓	✓
Statistics and Probability (SP)	✓	✓	✓
Functions (F)			✓



# California Comparison

## Common Core State Standards for CA DOMAINS

### K–5

- Counting and Cardinality (K only)
- Operations and Algebraic Thinking
- Number and Operations in Base 10
- Number and Operations–Fractions
- Measurement and Data

### 6–8

- Ratio and Proportional Relationships (grade 6–7)
- The Number System
- Expressions and Equations
- Functions (Grade 8)
- Geometry
- Statistics and probability

## California Standards • Grades K–7 STRANDS

- Number Sense
- Algebra and Functions
- Measurement and Geometry
- Statistics, Data Analysis and Probability
- Mathematical Reasoning

# California Grade 8 Options

- ▶ Goal for 8<sup>th</sup> grade students is Algebra 1
- ▶ Not all students have the necessary prerequisite skills for Algebra 1
- ▶ Two sets of standards for grade 8
  - Each set will prepare students for college and career
  - Standards for Algebra 1
    - Taken from 8<sup>th</sup> grade Common Core, high school Algebra content cluster and CA Algebra standards
  - 8<sup>th</sup> grade Common Core
- ▶ Goal of grade 8 Common Core is to finalize preparation for students in high school
- ▶ K–7 standards as augmented prepare students for either set of standards

# California Algebra 1

## Number and Quantity

### The Real Number System

Extend the properties of exponents to rational exponents.

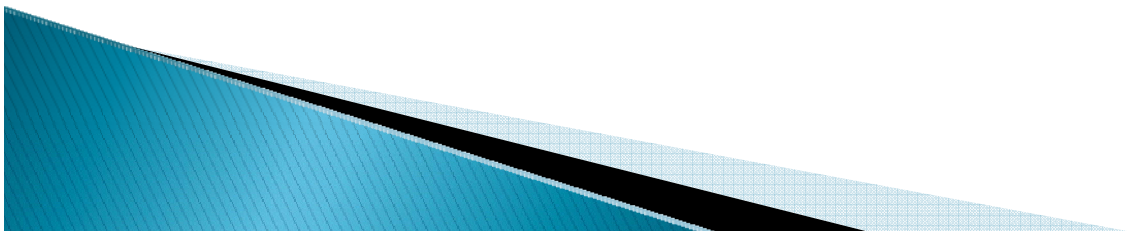
1. Explain how the definition of the meaning of rational exponents follows from extending the properties of integer exponents to those values, allowing for a notation for radicals in terms of rational exponents. For example, we define  $5^{1/3}$  to be the cube root of 5 because we want  $(5^{1/3})^3 = 5^{(1/3)3}$  to hold, so  $(5^{1/3})^3$  must equal 5. (Common Core Standard N-RN-1)
2. Rewrite expressions involving radicals and rational exponents using the properties of exponents. (Common Core Standard N-RN-2)

Use properties of rational and irrational numbers.

3. Understand informally that the sum or product of two rational numbers is rational; that the sum of a rational number and an irrational number is irrational; and that the product of a nonzero rational number and an irrational number is irrational. (Common Core Standard N-RN-3)

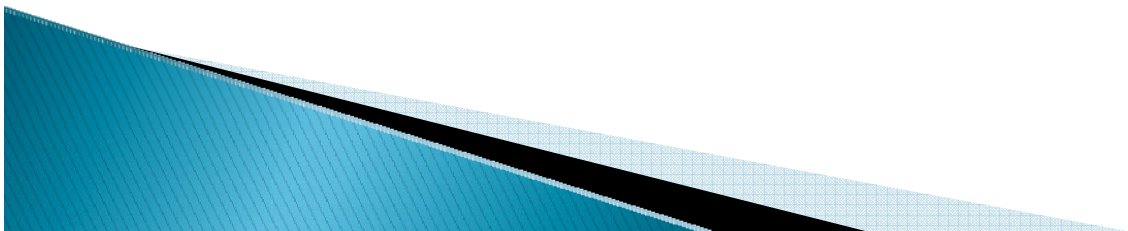
### Quantities\*

4. Define appropriate quantities for the purpose of descriptive modeling. (Common Core Standard N-Q-1)



# Mathematics Standards for High School

- ▶ Specify the math that all students should study to be college and career ready
- ▶ Identify additional math standards that students should learn in order to take advanced courses such as calculus, advanced statistics, or discrete mathematics. These are indicated by (+).
- ▶ Include the addition of two courses from California:
  - Calculus
  - Advanced Statistics and Probability
- ▶ Development of suggested course descriptions will be done by CDE as part of their long-range implementation plan
  - Traditional vs. Integrated





# High School Example-Geometry Content Cluster

## Expressing Geometric Properties with Equations

G-GPE

### Translate between the geometric description and the equation for a conic section

1. Derive the equation of a circle of given center and radius using the Pythagorean Theorem; complete the square to find the center and radius of a circle given by an equation.
2. Derive the equation of a parabola given a focus and directrix.
3. (+) Derive the equations of ellipses and hyperbolas given the foci, using the fact that the sum or difference of distances from the foci is constant.

**3.1 Demonstrate and explain how the geometry of the graph of a conic section (e.g., asymptotes, foci, eccentricity) depends on the coefficients of the quadratic equation representing it.** (CA Standard Algebra II – 16.0)

**3.2 Given a quadratic equation of the form  $ax^2 + by^2 + cx + dy + e = 0$ , use the method for completing the square to put the equation into standard form and recognize whether the graph of the equation is a circle, ellipse, parabola, or hyperbola. Then graph the equation.** (CA Standard Algebra II – 17.0)

**3.3 Be familiar with conic sections, both analytically and geometrically.** (CA Standard Math Analysis – 5.0)

### Use coordinates to prove simple geometric theorems algebraically

4. Use coordinates to prove simple geometric theorems algebraically. *For example, prove or disprove that a figure defined by four given points in the coordinate plane is a rectangle; prove or disprove that the point  $(1, \sqrt{3})$  lies on the circle centered at the origin and containing the point  $(0, 2)$ .*
5. Prove the slope criteria for parallel and perpendicular lines and use them to solve geometric problems (e.g., find the equation of a line parallel or perpendicular to a given line that passes through a given point).
6. Find the point on a directed line segment between two given points that partitions the segment in a given ratio.
7. Use coordinates to compute perimeters of polygons and areas of triangles and rectangles, e.g., using the distance formula.\*

# Mathematics Standards for High School

## ► Modeling Cluster

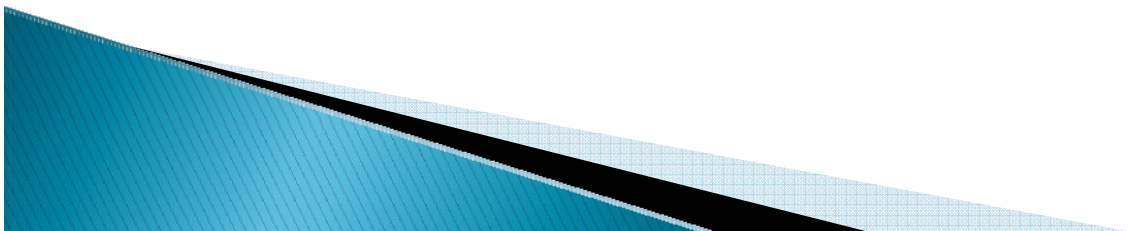
- Not a collection of topics but viewed in relation to other standards
- A Standard of Mathematical Practice
- Specific modeling standards appear throughout the high school standards and are indicated by a star symbol (★)

### Modeling with Geometry

G-MG

#### Apply geometric concepts in modeling situations

1. Use geometric shapes, their measures, and their properties to describe objects (e.g., modeling a tree trunk or a human torso as a cylinder).★
2. Apply concepts of density based on area and volume in modeling situations (e.g., persons per square mile, BTUs per cubic foot).★
3. Apply geometric methods to solve design problems (e.g., designing an object or structure to satisfy physical constraints or minimize cost; working with typographic grid systems based on ratios).★



# Some comparison examples

Grade	California Standard	Common Core
Kindergarten	Use concrete objects to determine the answers to addition and subtraction problems (for two numbers that are each less than 10).	Solve addition and subtraction word problems, and add and subtract within 10, e.g., by using objects or drawings to represent the problem.
First	Count, read, and write whole numbers to 100.	Count to 120, starting at any number less than 120. In this range, read and write numerals and represent a number of objects with a written numeral.
Third	Memorize to automaticity the multiplication table for numbers between 1 and 10.	Fluently multiply and divide within 100, using strategies such as the relationship between multiplication and division and the properties of operations.



# Some comparison examples

Grade	California Standard	Common Core
Fifth	Understand the concept of multiplication and division of fractions.	<p>Apply and extend previous understandings of multiplication to multiply a fraction or whole number by a fraction.</p> <p>Apply and extend previous understandings of division to divide unit fractions by whole numbers and whole numbers by unit fractions. (A unit fraction is one with a numerator of 1 and the denominator is a positive integer)</p>
Sixth	Interpret and use ratios in different contexts (e.g., batting averages, miles per hour) to show the relative sizes of two quantities, using appropriate notations ( $a/b$ , $a$ to $b$ , $a:b$ ).	Understand the concept of a ratio and use ratio language to describe a ratio relationship between two quantities.
Seventh	Use variables and appropriate operations to write an expression, an equation, an inequality, or a system of equations or inequalities that represents a verbal description (e.g., three is less than a number, half as large as area A).	Use variables to represent quantities in real-world and mathematical problems and construct simple equations and inequalities to solve problems about the quantities.

# Some comparison examples

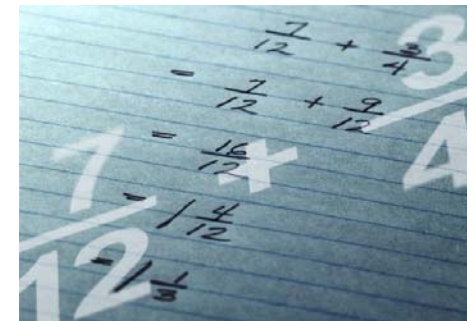
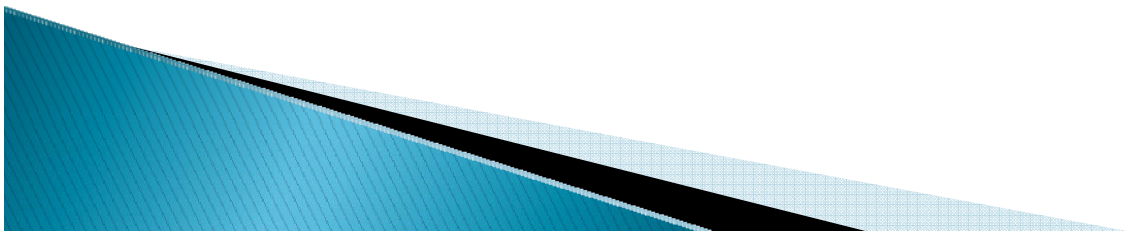
Grade/Course	California Standard	Common Core
Seventh	Construct and read drawings and models made to scale.	Solve problems involving scale drawings of geometric figures, including actual lengths and areas from a scale drawing and reproducing a scale drawing at a different scale.
Algebra	Algebra 1: Solve multistep problems, including word problems, involving linear equations and linear inequalities in one variable and provide justification for each step.	Algebra Content Cluster: Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters.
Geometry	Geometry: Use trigonometric functions to solve for an unknown length of a side of a right triangle, given an angle and a length of a side.	Geometry Content Cluster: Use trigonometric ratios and the Pythagorean Theorem to solve right triangles in applied problems.

# Grade Shifts: Some examples

Topic	Grade
Know from memory all sums of two one-digit numbers	End of grade 2
Know from memory all products of two one-digit numbers	End of grade 3
Initial development of multiplication and division	Grade 3
Initial development of fractions	Grade 3
Add or subtract simple fractions	Grade 4
Initial development of integers	Grade 6

# A Focus on Fractions

- ☆ Represent a fraction  $1/b$  on a number line diagram by defining the interval from 0 to 1 as the whole and partitioning it into  $b$  equal parts. Recognize that each part has size  $1/b$  and that the endpoint of the part based at 0 locates the number  $1/b$  on the number line. (3.NF.2.a)
- ☆ Solve word problems involving addition and subtraction of fractions referring to the same whole, including cases of unlike denominators, e.g. by using visual fraction models or equations to represent the problem. Use benchmark fractions and number sense of fractions to estimate mentally and assess the reasonableness of answers. *For example, recognize an incorrect result  $2/5 + 1/2 = 3/7$ , by observing that  $3/7 < 1/2$ .* (5.NF.2)



# Fraction Concepts

- ☆ Compare two fractions with the same numerator or the same denominator by reasoning about their size. Recognize that comparisons are valid only when the two fractions refer to the same whole. Record the results of comparisons with the symbols  $>$ ,  $=$ , or  $<$ , and justify the conclusions, e.g., by using a visual fraction model. ( 3.NF.3d)

*Discuss how you might compare pairs of fractions using a visual fraction model. For discussion purposes, use the following two fraction pairs:*

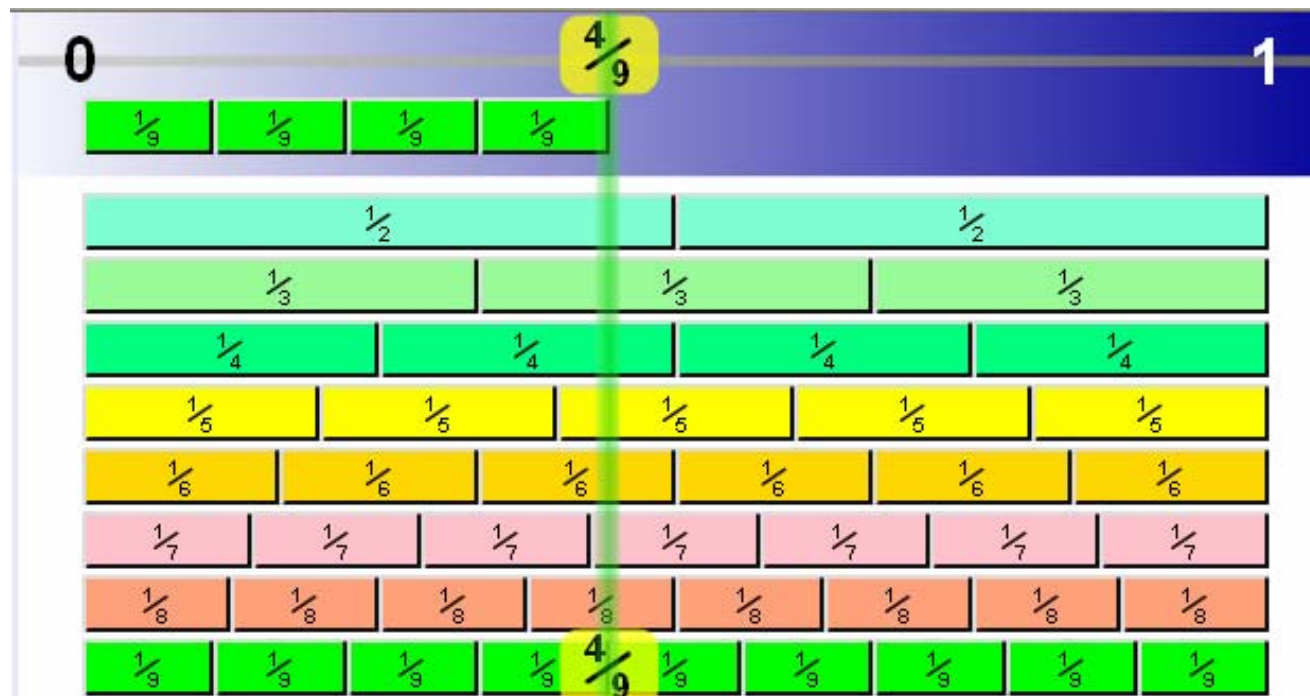
$7/9$  and  $4/9$  (same denominator)

$4/9$  and  $4/7$  (same numerator)



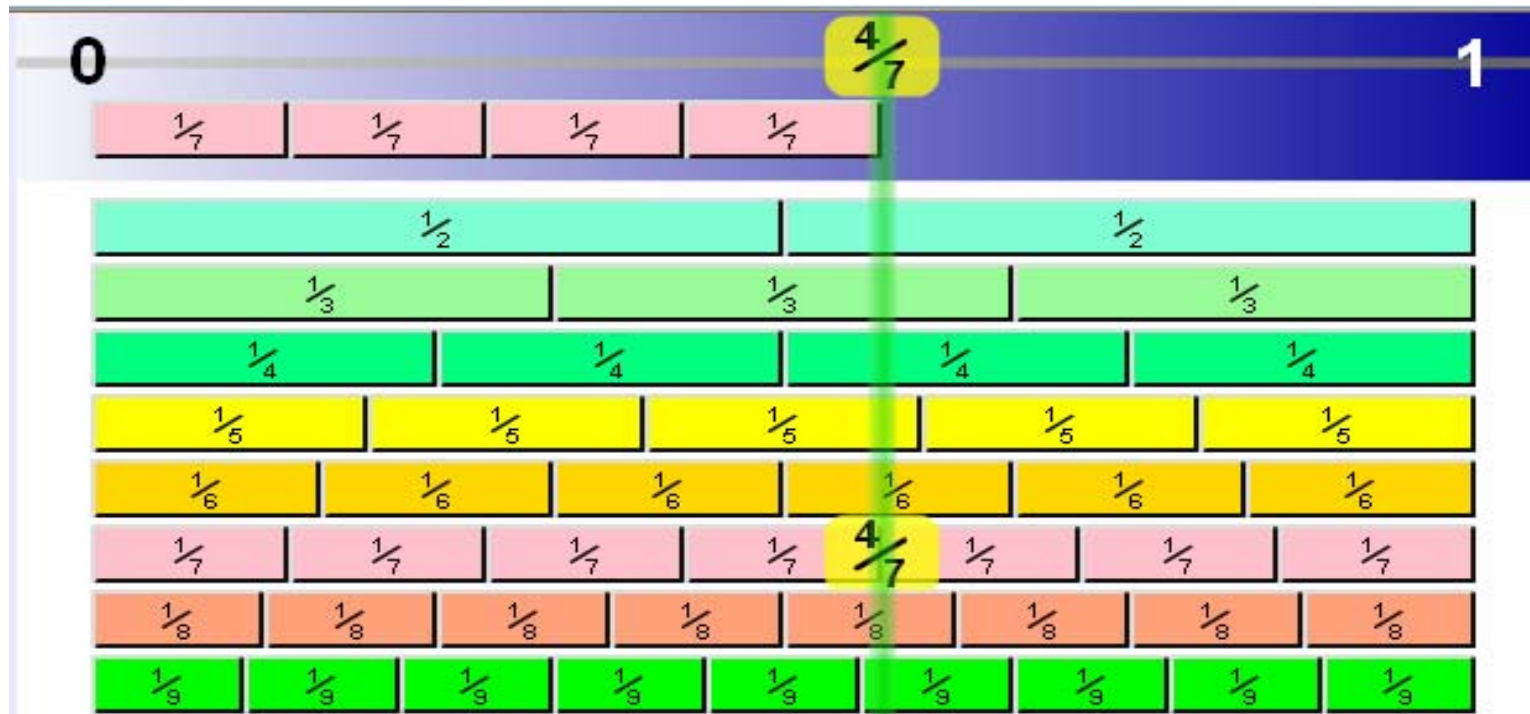


# Fraction Concepts



Source: [www.mathisfun.com/numbers/fraction-number-line.html](http://www.mathisfun.com/numbers/fraction-number-line.html)

# Fraction Concepts

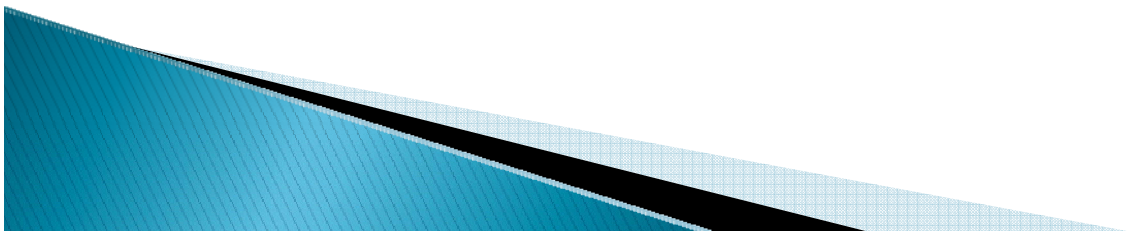


Source: [www.mathisfun.com/numbers/fraction-number-line.html](http://www.mathisfun.com/numbers/fraction-number-line.html)

# California's Additional 15%

**Based on the following central questions:**

- ▶ What K–12 CA Mathematics standards were not reflected in the CCS document?
- ▶ Which (of those) standards would substantively enhance and improve the CCS?
- ▶ Which would maintain the rigor of California's standards?



# Examples of Additional 15%:

- ▶ Added standards to develop ideas not included in CCS

- Grade 2–Operations and Algebraic Thinking

4.1 Use repeated addition, and counting by multiples to demonstrate multiplication.

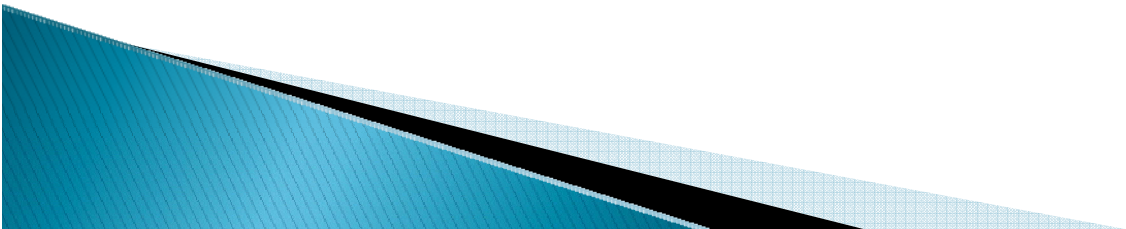
4.2 Use repeated subtraction and equal group sharing to demonstrate division.

- Grade 5–Operations and Algebraic Thinking

2.1 Express a whole number in the range 2-50 as a product of its prime factors. For example, find the prime factors of 24 and express 24 as  $2 \times 2 \times 2 \times 3$ .

- High School Geometry–Geometric Measurement and Dimension

5. Determine how changes in dimensions affect the perimeter, area, and volume of common geometric figures and solids. (CA Standard Geometry – 11.0)



# Examples of Additional 15%:

## ▶ Added language to existing standard

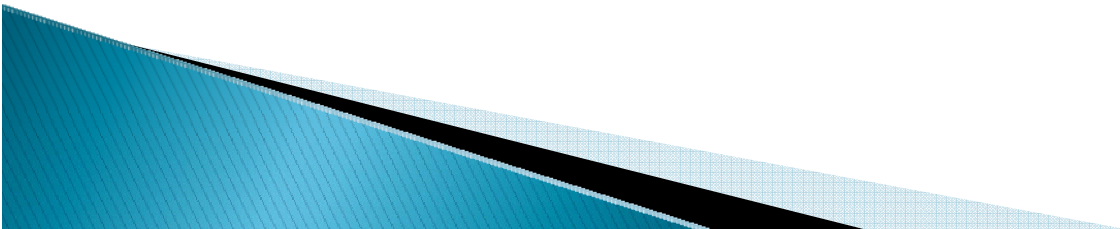
### ◦ Grade 2–Measurement and Data

**Work with time and money.**

7. Tell and write time from analog and digital clocks to the nearest five minutes, using a.m. and p.m. **Know relationships of time (e.g., minutes in an hour, days in a month, weeks in a year).**
8. Solve word problems involving **combinations of** dollar bills, quarters, dimes, nickels, and pennies, using \$ and ¢ symbols appropriately. *Example: If you have 2 dimes and 3 pennies, how many cents do you have?*

### ◦ Grade 4–Geometry

2. Classify two-dimensional figures based on the presence or absence of parallel or perpendicular lines, or the presence or absence of angles of a specified size. Recognize right triangles as a category, and identify right triangles. **(Two dimensional shapes should include special triangles, e.g., equilateral, isosceles, scalene, and special quadrilaterals, e.g., rhombus, square, rectangle, parallelogram, trapezoid.)**



# Examples of Additional 15%:

- ▶ Added a substantial section to an existing cluster
  - Grade 6–The Number System

**7.1 Apply and extend previous understandings of addition and subtraction to add and subtract rational numbers; represent addition and subtraction on a horizontal or vertical number line diagram.**

(Common Core Standard 7NS-1)

- a. Describe situations in which opposite quantities combine to make 0. For example, a hydrogen atom has 0 charge because its two constituents are oppositely charged.**  
(Common Core Standard 7NS-1a)
- b. Understand  $p + q$  as the number located a distance  $|q|$  from  $p$ , in the positive or negative direction depending on whether  $q$  is positive or negative. Show that a number and its opposite have a sum of 0 (are additive inverses). Interpret sums of rational numbers by describing real-world contexts.** (Common Core Standard 7NS-1b)
- c. Understand subtraction of rational numbers as adding the additive inverse,  $p - q = p + (-q)$ . Show that the distance between two rational numbers on the number line is the absolute value of their difference, and apply this principle in real-world contexts.**  
(Common Core Standard 7NS-1c)
- d. Apply properties of operations as strategies to add and subtract rational numbers.**  
(Common Core Standard 7NS-1d)

# Examples of Additional 15%:

- ▶ Added a substantial section to an existing cluster
  - High School Algebra–Seeing Structure in Expression

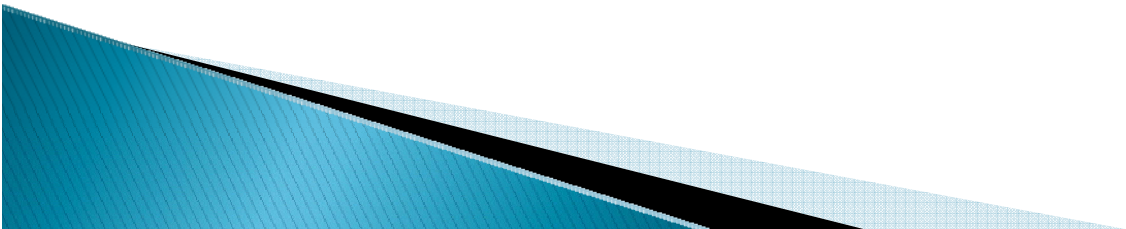
## Write expressions in equivalent forms to solve problems

3. Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression.\*
  - a. Factor a quadratic expression to reveal the zeros of the function it defines.
  - b. Complete the square in a quadratic expression to reveal the maximum or minimum value of the function it defines.
  - c. Use the properties of exponents to transform expressions for exponential functions. *For example the expression  $1.15^t$  can be rewritten as  $(1.15^{1/12})^{12t} \approx 1.012^{12t}$  to reveal the approximate equivalent monthly interest rate if the annual rate is 15%.*
  - d. Prove simple laws of logarithms.** (CA Standard Algebra II – 11.2)
  - e. Use the definition of logarithms to translate between logarithms in any base.** (CA Standard Algebra II – 13.0)
  - f. Understand and use the properties of logarithms to simplify logarithmic numeric expressions and to identify their approximate values.** (CA Standard Algebra II – 14.0)
4. Derive the formula for the sum of a finite geometric series (when the common ratio is not 1), and use the formula to solve problems. *For example, calculate mortgage payments.*\*



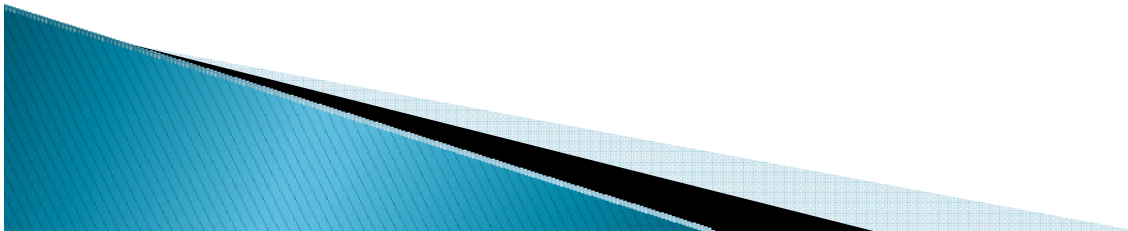
# Examples of Additional 15%:

- ▶ Added two courses from California Standards:
  - Calculus
  - Advanced Placement Probability and Statistics





Share at your table an “aha” or highlight of the CCSS that you did not previously have.





# COMMON CORE STATE STANDARDS FOR **Mathematics**

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Appendix A:

Designing High School  
Mathematics Courses  
Based on the Common  
Core State Standards

**Available at <http://www.corestandards.org/the-standards>**

# Model Course Pathways for Mathematics

Courses in higher level mathematics: Precalculus, Calculus (upon completion of Precalculus), Advanced Statistics, Discrete Mathematics, Advanced Quantitative Reasoning, or other courses to be designed at a later date, such as additional career technical courses.

Algebra II

Geometry

Algebra I

**Pathway A**

*Traditional in U.S.*

Mathematics  
III

Mathematics II

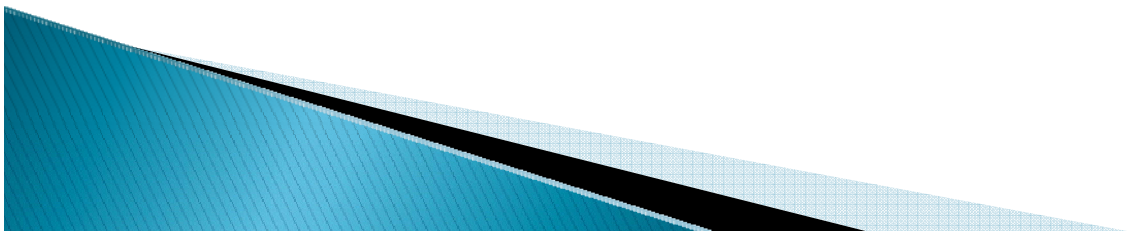
Mathematics I

**Pathway B**

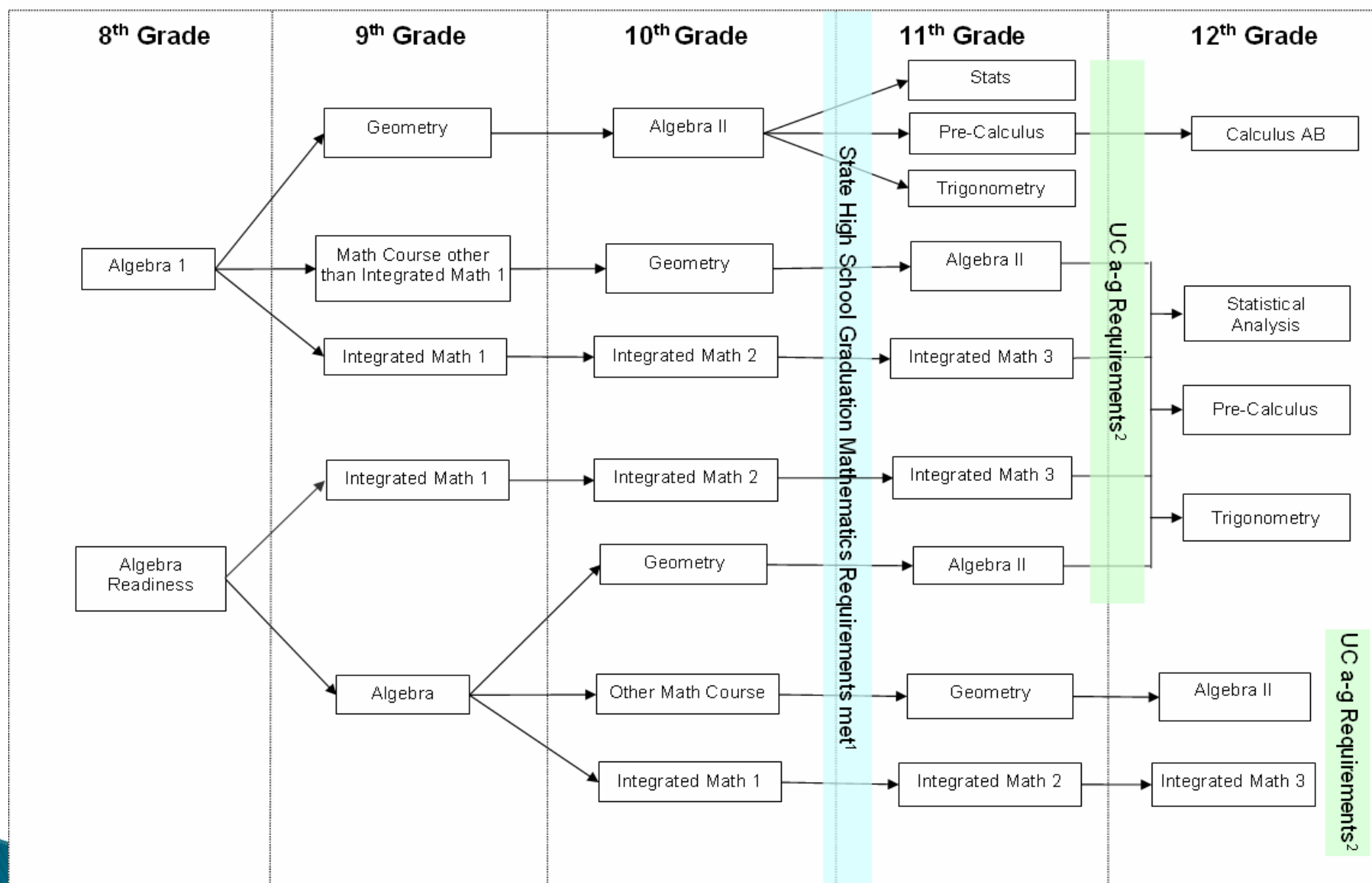
*International Integrated approach  
(typical outside of U.S.)*

# High School Courses

- ▶ CBEDS has approximately 40 codes and descriptions for middle and high school mathematics courses.
- ▶ Code 2498 is for a mathematics course not identified in the series of courses outlined on the CBEDS assignment code list.
- ▶ Available online at:  
<http://www.cde.ca.gov/ds/dc/cb/subjects.asp#m>



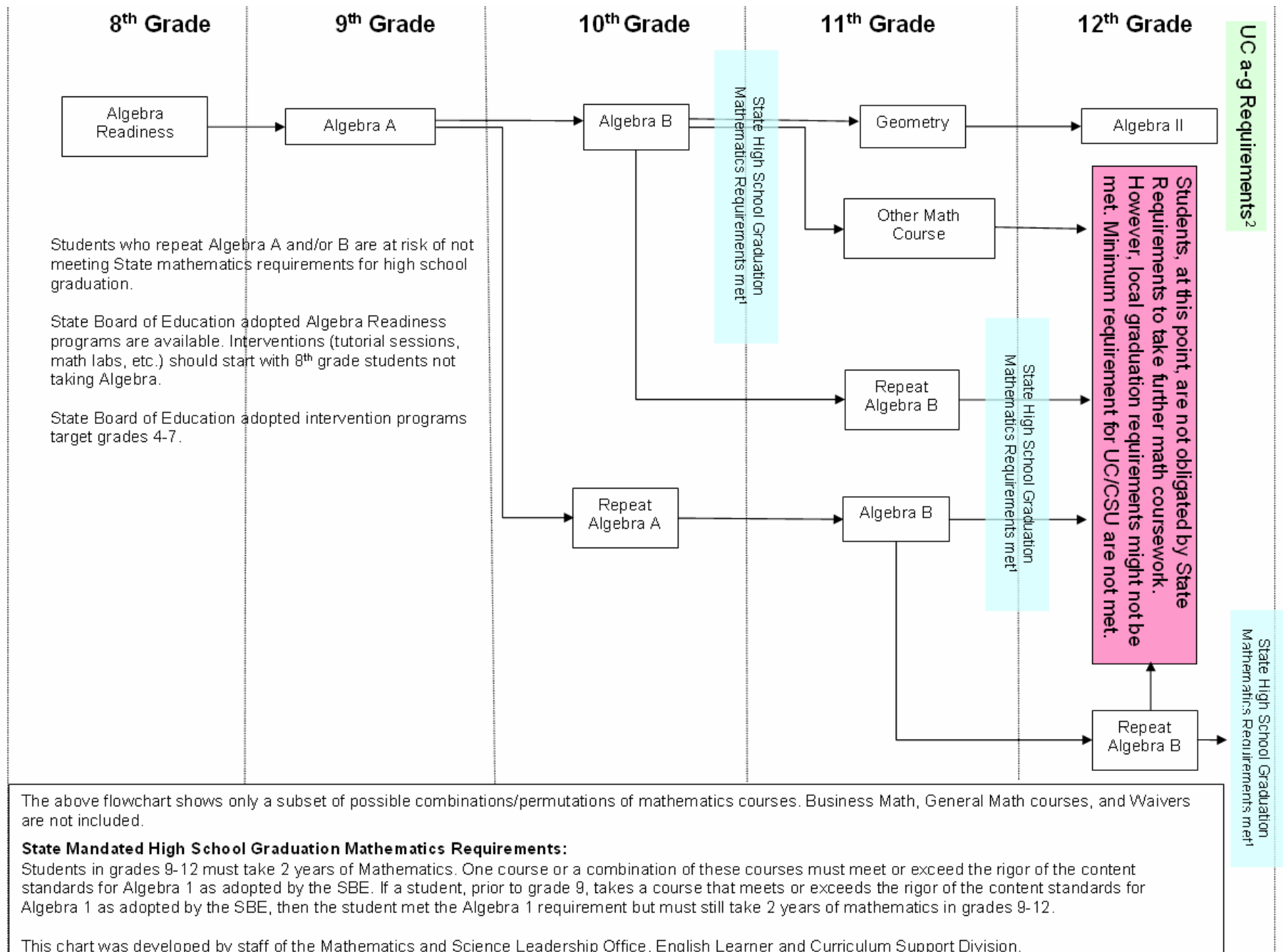
## SAMPLE MATHEMATICS COURSE SEQUENCE



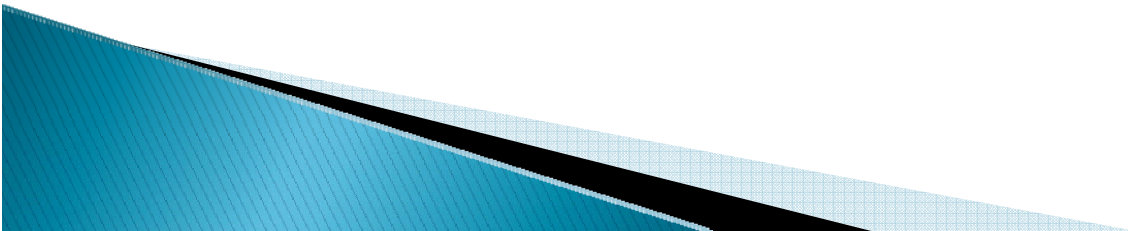
1. The California high school graduation requirement is for two years of mathematics, including Algebra I

2. The University of California admission requirement is for three years of mathematics, including algebra, geometry, and intermediate algebra.

This chart was developed by staff of the Mathematics and Science Leadership Office, English Learner and Curriculum Support Division.

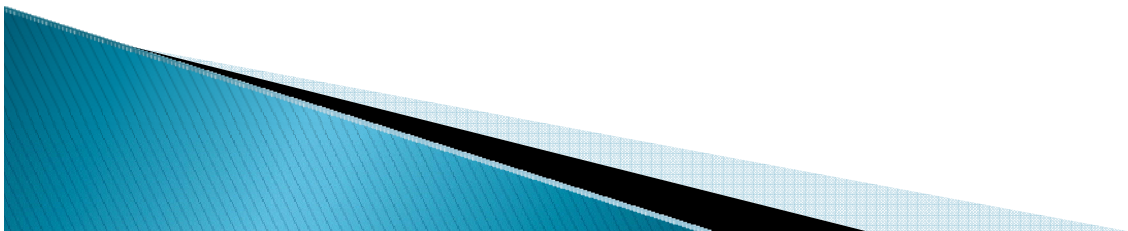


# Assessments



# Race to the Top Assessment Program Competition

- ▶ \$350 million of Race to the Top Fund set aside for awards to consortia of states to design and develop common K–12 assessment systems aligned to common, college– and career–ready standards.
- ▶ Competition asked consortia to design assessment systems that meet dual needs of:
  - Accountability
  - Instructional improvement





# Race to the Top Assessment Program Competition

- ◆ In September 2010, the U.S. Department of Education awarded two grants:
  - Partnership for Assessment of Readiness for College and Careers (PARCC)
  - Smarter Balanced Assessment Consortium (SBAC)
- ◆ The winning consortia have four years to develop assessments systems, and participating states will administer new assessments statewide by 2014–2015.

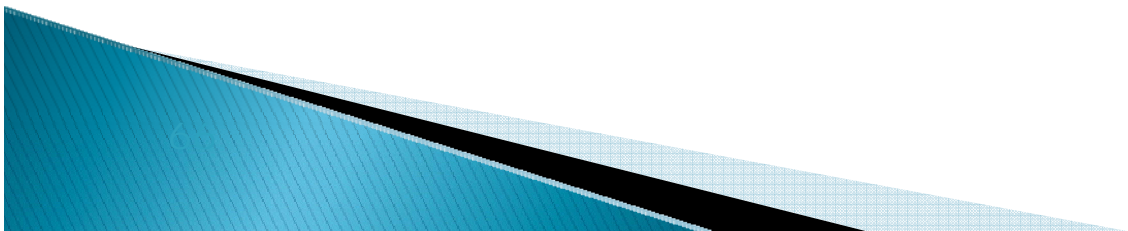
# PARCC States

## 13 Governing States

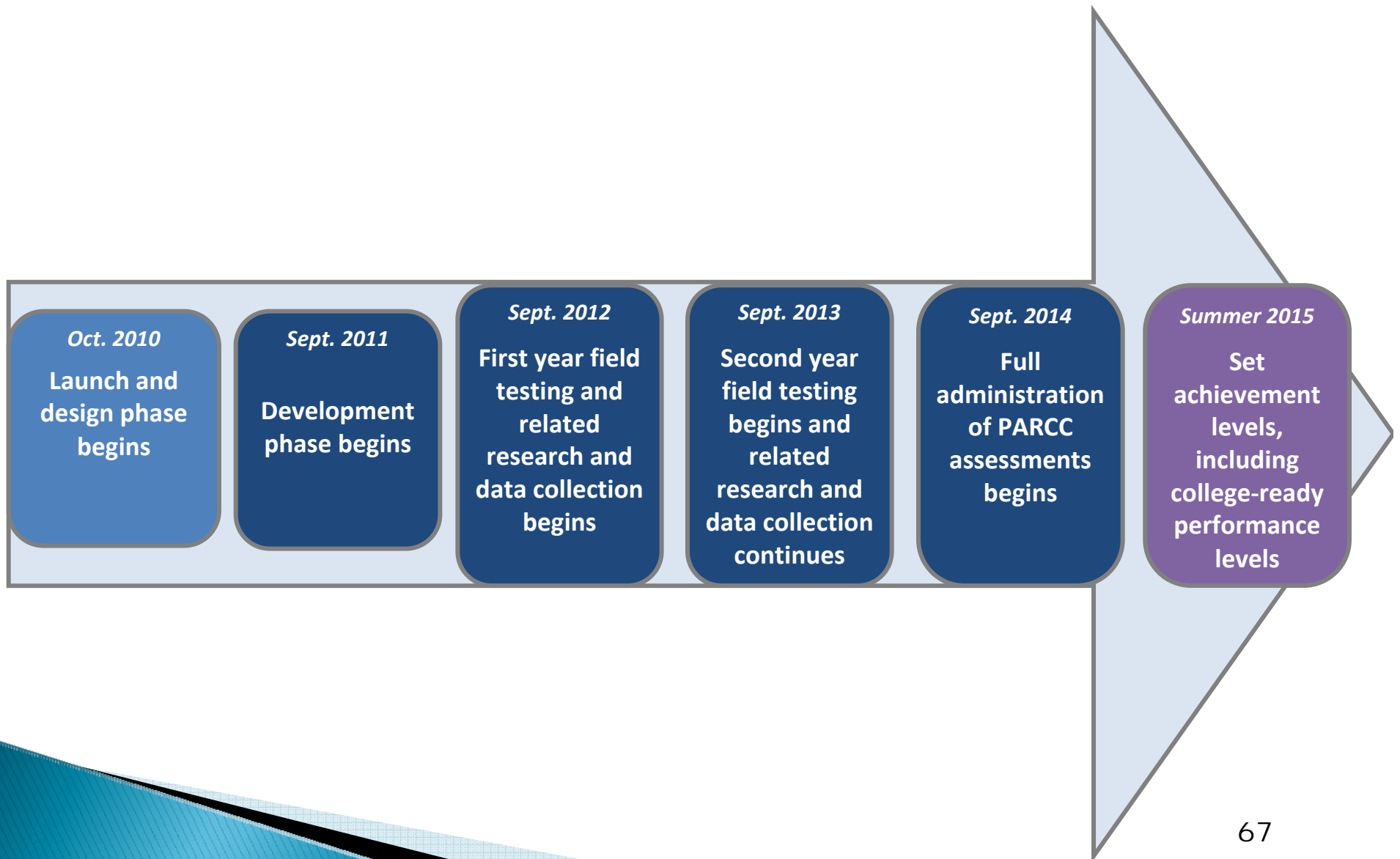
- Arizona
- Arkansas
- District of Columbia
- Florida (*Fiscal Agent*)
- Georgia
- Illinois
- Indiana
- Louisiana
- Maryland
- Massachusetts (*Board Chair*)
- New York
- Rhode Island
- Tennessee

## 12 Participating States

- Alabama
- California
- Colorado
- Delaware
- Kentucky
- Mississippi
- New Jersey
- North Dakota
- Ohio
- Oklahoma
- Pennsylvania
- South Carolina



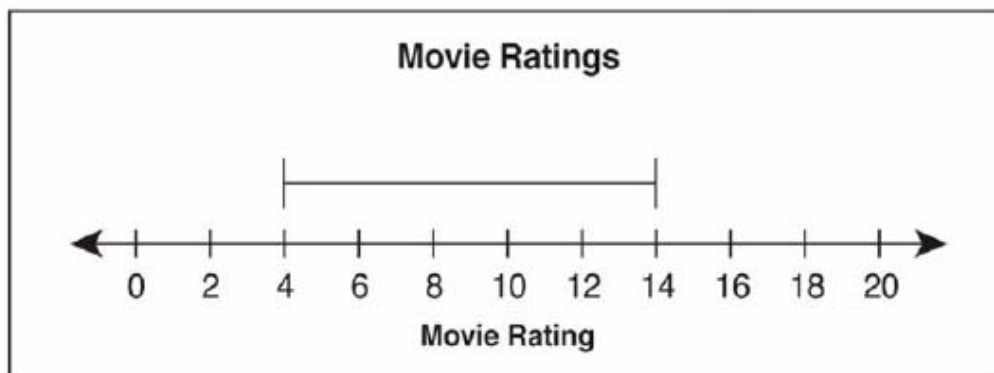
# PARCC Timeline



Fifteen students watched a movie and rated the movie on a scale of 1 (very bad movie) to 20 (very good movie). Their ratings are shown in the table.

- a. Using the data in the table, complete the box-and-whisker plot by adding the upper quartile, the lower quartile, and the median. A box will be formed with the three points indicated. You will be able to adjust the box once created if needed.

**Click on the line to add the upper quartile, lower quartile, and median.**



**Movie Ratings**

Student	Movie Rating
Andy	14
Bee	8
Cory	5
Doug	8
Jamal	5
Jasper	11
Jenn	12
Katie	13
Martin	9
Pat	11
Rose	13
Sam	4
Sofie	7
Thomas	12
Young	9

# Websites

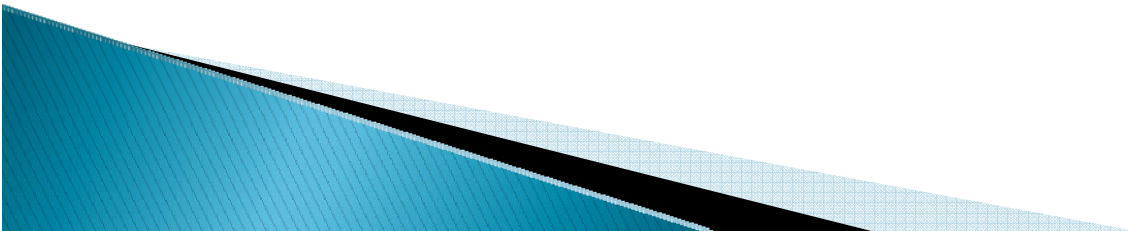
- ▶ California Dept. of Education  
<http://www.cde.ca.gov/ci/cc>
- ▶ SCOE Info and Support for CCSS  
<http://www.scoe.net/castandards/index.html>
- ▶ National Initiative for the Common Core State Standards  
<http://www.corestandards.org>
- ▶ PARCC Assessment  
<http://www.achieve.org/files/CCSS&Assessments.pdf>

# Wikispace Documents

<http://algebraforum.wikispaces.com>

- ▶ FAQ
- ▶ CCSS Mathematics & Language Arts
- ▶ Appendices
- ▶ Approved Recommendations (bolded/underlined)

So....



# What Now?

## ► Stay the Course!

- More similarities than differences in the standards
- Implement a truly balanced math program as this will support the mathematical practices
- Continue to use quality assessments to inform and drive effective instruction
- Provide opportunities for teachers to collaborate and plan

